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## Primary Closure of the Common Bile Duct after Exploration for Gallstones

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### I. Introduction

Many authors have recommended choledochal drainage after common duct exploration for gallstones<sup>1)2)3)6)</sup>. The present authors, however<sup>4)7)9)10)11)</sup>, have recently attempted primary closure of the common duct in selected cases and have gained good results without any adverse outcomes.

### II. Clinical experiences

In Table 1 are shown the kinds and sites of gallstones obtained from 2,144 cases operated on at the 37 affiliated hospitals of the Department of Surgery Kyoto University School of Medicine during the last 20 months<sup>5)</sup>. Cholesterol stones which are most frequently seen in present Japan are predominantly situated in the gallbladder alone. Among these

Table 1 Kinds and sites of gallstones at 37 hospitals

Kinds Sites	cholesterol stones	bilirubin stones	rare stones	Total (%)
GB	1303	185	117	1605 (74.9)
GB & CBD	179	160	11	350 (16.3)
CBD	28	159	2	189 ( 8.8)
Total (%)	1510 (70.4)	504 (23.5)	130 (6.1)	2144 (100.0)

GB: gallbladder, CBD : common bile duct

Table 2 Frequency of choledochotomy and external  
choledochostomy in the 2,144 cases

Choledochotomy.....	537 cases
T-tube drainage.....	412 (76.7%)
Primary closure of common bile duct.....	125 (23.3%)
Sites of gallstones	
Gallbladder .....	54
Gallbladder and common bile duct ...	53
Common bile duct.....	18
	71

Key words : Tube drainage, primary closure, Cholesterol stone

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2,144 cases, 537 cases underwent choledochotomy for common duct exploration, and in 412 cases (76.7%) the common ducts were drained with T-tubes, while in 125 cases (23.3%) including 71 cases with common duct stones the common ducts were closed primarily with absorbable suture materials (4-0 or 5-0 Deoxn®) (Table 2). Their postoperative course was almost always uneventful.

### III. Data from enquête on surgery for choledocholithiasis

Enquête on surgical techniques for choledocholithiasis was collected from 163 surgical clinics in Japan.

As shown in Table 3, 102 surgeons (63%) drain routinely every incised common duct regardless of presence or absence of common duct stones. However, 51 surgeons (31%) decide whether or not to drain the common duct according to kinds of stones and to conditions of the bile ducts. The conditions which are considered to indicate choledochotomy

Table 3 Choledochal drainage after choledochotomy

1) In all cases .....	102 (63%)
2) In all cases with common bile duct stones .....	7 (4%)
3) According to kind of stones .....	4
4) According to conditions of bile ducts (dilatation, infection etc.) .....	25
5) According to kind of stones and conditions of bile ducts .....	22
6) In no cases .....	2
7) Other .....	1

51  
(31%)

From enquête on surgical techniques for choledocholithiasis, presented at the Second Japanese Meeting for Biliary Tract Surgery in Oct. 1977.

Table 4 Indication of choledochotomy during surgery

Findings of peroperative cholangiography .....	95.9%
Macroscopic findings of biliary tracts .....	65.3%
Patient's history .....	46.5%
Results of operative biliomanometry .....	21.2%

From the enquête.

Table 5 Operative findings indicating choledochotomy

Diameter of common bile ducts	
more than 1 cm .....	38.8%
more than 1.5 cm .....	42.4%
more than 2.0 cm .....	9.4%
neglect .....	9.4%
Other findings	
Multiple small stones in the gallbladder .....	31.8%
Dilatation of cystic duct .....	21.2%
Hard pancreas .....	10.6%

From the enquête.

are listed in Table 4. Almost all surgeons decide whether or not to open the common ducts according to the findings of peroperative cholangiography. Among various operative findings, dilatation of the common ducts are considered the most important indication for choledochotomy (Table 5).

As the tubes inserted into the common ducts, 156 surgeons employ T-tubes. And while 32 surgeons use slender tubes, 90 surgeons are inclined to use T-tubes of as large as possible, probably preparing for the non-operative extirpation of possible retained stones<sup>13)</sup>.

#### IV. Discussion

If there are biliary infection and stasis due to either stenosis or dilatation of the bile ducts and if there is any suspicion of retained stones, the common bile ducts should, of course, be drained with tubes, preferably with T-tubes of a possible large diameter.

Since cholesterol stones are exclusively formed in the gallbladder<sup>8)12)</sup>, cholesterol stones found in the common ducts must originate in the gallbladder and then migrate into the common ducts (secondary common duct stones). One may close primarily the common ducts after extirpation of cholesterol stones from the ducts, if he can be sure that no more stones are retained in the biliary tracts by means of peroperative cholangiography, choledochoscopy and so on, and if there are no remarkable changes in the bile ducts.

By primary closure of the common ducts, any hazards resulting from external choledochostomy and extraction of the T-tubes can be avoided and duration of hospitalization can be curtailed considerably. Generally speaking, healing of any wounds by first intention (*Sanatio per primam intentionem*) is by far desirable than secondary healing.

#### V. Conclusion

Cholesterol gallstones predominantly seen in present Japanese people are exclusively formed in the gallbladder. When the stones extirpated from the common ducts are cholesterol stones, primary closure of the common ducts can be attempted, if there is neither suspicion of retained stones nor secondary changes of the bile ducts.

The gist of this article was presented at the 39th Annual Meeting of Japan Practical Surgical Society held on 23rd October 1977 at Okayama.

The authors wish to express their sincere gratitude to surgeons, who kindly answered to the enquête and whose names were listed in the program of The Second Japanese Meeting for Biliary Tract Surgery held on 17th October 1977 at Kyoto.

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## 和文抄録

# 胆石症手術における総胆管ドレナージの 適応と、胆管の一期的閉鎖について

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胆石症手術に際して総胆管を切開したのちには、原則として総胆管ドレナージを行なうというのが大方の意見であり、今回われわれが行なった全国的なアンケートの集計結果でも、総胆管結石の有無にかかわらず、T字管を入れるとするものが163施設中102と過半数を占めていた。しかし結石の種類や胆管の状態によってきめるとするものが51施設（31%）あった。

一方、著者らが関連病院から集計した胆石症手術2,144例中、総胆管を切開したものは537例で、そのうち125例に総胆管の一期的閉鎖が行なわれていた。そのなかには胆管胆石のあった71例も含まれていた。

現在わが国で最も多くみられるコレステロール胆石はもっぱら胆嚢内のみで形成されるものであり、胆管内のコレステロール石は二次的胆管胆石である。したがって、術中、胆管から得た結石がコレステロール石であって、結石遺残のおそれがなく、また胆管に著しい二次的変化がみられない時には総胆管切開口を一期的に閉鎖してよい。これによってT字管の挿入並びに抜去に伴う障害をさけ、かつ入院期間を短縮することができる。一般に、可能なる限り創の一期的癒合をはかるのは外科医の責務である。